CLAIMS

1. Method of determining the position of a mobile terminal (UE), including a step of said terminal (UE) acquiring pseudo-random codes modulating signals received from satellites (SN) in view belonging to a constellation (CS) of positioning satellites and related to a reference time by comparison with signal replicas resulting from hypotheses, and a step of determining the position of said terminal (UE) from said acquired codes and from navigation data contained in said signals, which method is characterized in that, in the acquisition step, i) assistance data is transmitted to said terminal (UE) representing an approximate reference time and its approximate position, ii) estimated positions of said constellation (CS) of satellites (SN), estimated distances between said terminal (UE) and each of said satellites (SN) in view and associated Doppler effects are determined as a function of pairs of hypotheses relating to said approximate reference time and said approximate position, iii) a signal replica is determined for each pair of hypotheses corresponding to said estimated positions and distances and to said associated Doppler effects over a selected time interval, and iv) the pair of hypotheses corresponding to the signal replica having a maximum correlation with the signal received during said time interval is selected in order to determine said pseudo-random codes modulating said received signals.

2. Method according to Claim 1, characterized in that said assistance data comes from an assistance server (SE) connected to a cellular communication network of said terminal (UE).

3. Method according to Claim 2, characterized in that said assistance data is transmitted to said terminal (UE) via said cellular communication network.

4. Method according to either Claim 2 or Claim 3, characterized in that said approximate position represents the cell in which said terminal (UE) is situated when it requests said assistance data.

5. Method according to Claim 4, characterized in that the acquisition timing clock of said terminal (UE) is slaved to the timing clock of the base station (BTS) managing the cell in which it is situated.

6. Method according to any one of Claims 1 to 5,

characterized in that selecting a signal replica consists in determining for each signal replica a function representing its energy of correlation with said received signal during the time interval and then retaining the signal replica whose energy is the highest.

7. Method according to any one of Claims 1 to 6, characterized in that said assistance data comprises complementary navigation data selected in a group comprising at least ephemerides of the satellites (SN) in view, first time corrections of said satellites in view representing the time difference between said reference time and their timing clock, and second time corrections representing disturbances induced by the ionosphere to the propagation of the signals transmitted by said satellites (SN) in view.

8. Method according to any one of Claims 1 to 7, characterized in that said assistance data comprises complementary navigation data coming from an augmentation system (SG) connected to the satellite navigation system (CS).

9. Method according to any one of Claims 1 to 8, characterized in that said assistance data comprises data representing a three-dimensional model of the cell in which said requesting terminal (UE) is situated.

10. Method according to any one of Claims 1 to 9, characterized in that information data representing the position of the terminal (UE) is stored in corresponding relationship to an identifier of the cell in which it is situated.

11. Method according to Claim 10, characterized in that said position is also stored in corresponding relationship to auxiliary data representing the quality of said information data transmitted.

12. Method according to Claim 4 in combination with either Claim 10 or Claim 11, characterized in that a three-dimensional model of said communication network is generated from said cell identifiers and said information data and/or corresponding auxiliary data, after which said three-dimensional model of the communication network is stored.

13. Method according to Claim 9 in combination with Claim 12, characterized in that said three-dimensional cell model transmitted to said terminal (UE) is a portion of the three-dimensional model of the

communication network.

14. Method according to any one of Claims 1 to 13, characterized in that measurements are effected representing the dynamics of said mobile terminal (UE), a speed, an acceleration and a variation of acceleration relative to each satellite (SN) in view are estimated from said measurements and from said assistance data, after which an induced phase is deduced therefrom, and said signal replica is determined taking account of said induced phase.

15. Mobile terminal (UE) comprising means (CR) for acquiring pseudo-random codes modulating signals received from satellites (SN) in view belonging to a constellation (CS) of positioning satellites and related to a reference time by comparison with signal replicas resulting from hypotheses, and computation means (MC1-MC3) for determining the position of said terminal (UE) from said acquired codes and from navigation data contained in said received signals, which terminal is characterized in that said acquisition means (CR), on receiving assistance data representing an approximate reference time and the approximate position of said terminal (UE), determine estimated positions of said constellation of satellites (SN), estimated distances between said terminal (UE) and each of said satellites (SN) in view and associated Doppler effects as a function of pairs of hypotheses relating to said approximate reference time and said approximate position, and then determine a signal replica for each pair of hypotheses corresponding to said estimated positions and distances and to said associated Doppler effects over a selected time interval, and select the pair of hypotheses corresponding to the signal replica having a maximum correlation with the received signal during said time interval in order to determine said pseudo-random codes modulating said received signals.

16. Terminal according to Claim 15, characterized in that it is adapted to communicate within a cellular communication network each cell of which is managed by a base station (BTS) and said approximate position represents the cell in which it is situated when it requests said assistance data.

17. Terminal according to Claim 16, characterized in that said acquisition means (CR) comprise a timing clock slaved to the timing clock of the base station (BTS) managing the cell in which it is situated.

18. Terminal according to any one of Claims 15 to 17, characterized in that said acquisition means (CR) select a signal replica by determining for each signal replica a function representing its energy of correlation with said signal received during the time interval and thereafter retain the signal replica having the highest energy.

19. Terminal according to any one of Claims 15 to 18, characterized in that said assistance data comprises complementary navigation data selected in a group comprising at least ephemerides of the satellites (SN) in view, first time corrections of said satellites (SN) in view representing the time difference between said reference time and their timing clock, and second time corrections representing disturbances induced by the ionosphere to the propagation of the signals transmitted by said satellites (SN) in view.

20. Terminal according to any one of Claims 15 to 19, characterized in that said assistance data comprises data representing a three-dimensional model of the cell in which said requesting terminal (UE) is situated.

21. Terminal according to Claim 20, characterized in that it determines said position with the aid of said data representing a three-dimensional cell model received.

22. Terminal according to any one of Claims 15 to 21, characterized in that said assistance data comprises complementary navigation data coming from an augmentation system (SG) connected to said satellite navigation system (CS).

23. Terminal according to any one of Claims 18 to 22, characterized in that it transmits to an assistance server (SE) of said cellular communication network information data representing its position so that said information data can be stored in a database (BD) in corresponding relationship to an identifier of the cell in which it is situated.

24. Terminal according to any one of Claims 15 to 23, characterized in that it comprises a micro-inertia measuring device (DM) for delivering measurements representing the dynamics of said terminal and said acquisition means (CR) are adapted to estimate from said measurements and said assistance data a speed, an acceleration and a variation of acceleration relative to each satellite (SN) in view, to deduce

therefrom an induced phase, and then to determine said signal replica taking account of said induced phase.

25. Terminal according to Claim 24, characterized in that said measuring device (DM) takes the form of a micro-inertia micro-electro-mechanical system.

26. Assistance server (SE) for a cellular communication network communicating with mobile terminals (UE), characterized in that it transmits assistance data via said communication network to mobile terminals (UE) according to any one of Claims 15 to 25 after receiving requests emanating therefrom.

27. Server according to Claim 26, characterized in that it transmits to each requesting terminal (UE) assistance data comprising complementary navigation data selected in a group comprising at least ephemerides of the satellites (SN) in view, first time corrections of said satellites (SN) in view from said terminal (UE) representing the time difference between said reference time and the timing clock of the terminal (UE), and second time corrections representing disturbances induced by the ionosphere to the propagation of the signals transmitted by said satellites (SN) in view from said terminal and data representing a three-dimensional model of the cell in which said requesting terminal (UE) is situated.

28. Server according to either Claim 26 or Claim 27, characterized in that it comprises receiving means (R) for receiving messages from a satellite navigation system (CS) and transmitting to each requesting terminal (UE) assistance data comprising navigation data extracted from messages coming from said satellite navigation system (CS).

29. Server according to Claim 28, characterized in that said receiver means (R) receive messages from an augmentation system connected to said satellite navigation system (CS) and transmit to each requesting terminal (UE) assistance data comprising complementary navigation data extracted from messages coming from said augmentation system and representing said satellite navigation system (CS).

30. Server according to any one of Claims 26 to 29, characterized in that it comprises processing means (PM) which, on receiving information data representing the position of a terminal (UE), store said information data in a database (BD) in corresponding relationship to an

identifier of the cell of a cellular communication network in which said terminal (UE) is situated.

31. Server according to Claim 30, characterized in that said processing means (PM) determine auxiliary data representing the quality of said received information data and store that auxiliary data in said database (BD) in corresponding relationship to said cell identifier and said information data representing the position of the terminal (UE).

32. Server according to either Claim 30 or Claim 31, characterized in that said processing means (PM) generate a three-dimensional model of said communication network from said cell identifiers and said information data and/or corresponding auxiliary data and then store said three-dimensional model of the communication network in said database (BD).

33. Server according to Claim 26 in combination with Claim 32, characterized in that said processing means (PM) extract from said database (BD) a portion of said three-dimensional model of the communication network representing said three-dimensional model of the cell in which said requesting terminal (UE) is situated in order to transmit it to it.

34. Server according to any one of Claims 26 to 32, characterized in that said processing means (PM) extract from a database (BD) storing portions of a three-dimensional model of said communication network in corresponding relationship to cell identifiers the portion of the model stored in corresponding relationship to the identifier of the cell in which a requesting terminal (UE) is situated in order to transmit said extracted portion to it.

35. Use of the method, mobile terminal (UE) and assistance server (SE) according to any one of the preceding claims for multiple-access phase-modulated L-band signals.

36. Use according to Claim 35, characterized in that said multiple-access phase-modulation is effected in accordance with the W-CDMA technique.

37. Use of the method, mobile terminal (UE) and assistance server (SE) according to any one of Claims 1 to 34 in RNSS type satellite positioning networks (SN).

38. Use according to Claim 37, characterized in that said satellite positioning network (SN) is of the GPS type.

39. Method of enriching navigation assistance data for determining the position of a mobile terminal, wherein a navigation assistance data server in a mobile telephone network enriches the assistance data it sends to the mobile terminal with corrections broadcast by an SBAS system (of the WAAS, EGNOS, MSAS, etc. type), and wherein said enrichment may be established by one of the following methods:

-broadcasting a modified navigation model (ephemerides) taking account of a portion of the SBAS corrections,

-broadcasting differential local corrections computed on the basis of the corrections broadcast by an SBAS system (of the WAAS, EGNOS, MSAS, etc. type).

40. Method comprising:

-an assistance server transmitting to a mobile moving around in a mobile cellular network navigation assistance data supplying it with a representation of the effect of the three-dimensional environment of said mobile, wherein that representation may, for example, be a probability density of masking of satellite signals coming from a given azimuth/elevation direction, in which case the server sends said mobile an azimuth-elevation rosette containing the blocking probability density, and

-a mobile using that probability density to improve its positioning computation algorithms,

-by initiating a search for satellite signals in decreasing order of blocking probability, and

-by improving multipath rejection using information deduced from the probability density.

41. Device for supplying a representation of the effect of the three-dimensional model according to Claim 40 of the cell or cells adjacent the cell in which a mobile terminal is moving around, that representation supplying to the mobile terminal a probability density of masking in a given direction, for example.